TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

PROCESS OPTIMIZATION -- EXTENSION OF PLUTONIUM PRECIPITATION PROCESS FOR HANFORD'S PLUTONIUM FINISHING PLANT (PFP)

Identification No.: RL-99-004-NM
Date: November 2000

Program: Nuclear Materials Stabilization
OPS Office/Site: Richland Operations Office/Hanford Site
PBS No.: RL-CP03
Waste Stream: TBD
TSD Title: TBD
Operable Unit (if applicable): N/A
Waste Management Unit (if applicable): N/A
Facility: Plutonium Finishing Plant (234-5Z)

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority:

____ 1. Critical to the success of the ACPC.
_X_ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high life-cycle cost savings of risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).
____ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Process Optimization – Extension of Pu Precipitation Process for Hanford's Plutonium Finishing Plant (PFP).

Need/Opportunity Category: *Technology Opportunity*

Need Description: The need is to optimize and further develop a precipitation process to accept various impure plutonium nitrate solutions with plutonium concentrations less than 50 g Pu/L. These impure materials initially were precipitated using the $Mg(OH)_2$ process developed by LANL for Rocky Flats. Rocky Flats has had very good experience with the process, but has not run solutions at concentrations above 25 g Pu/L. The PFP had difficulty with excessive solids volumes and moisture retention in thermally stabilized product using the $Mg(OH)_2$ precipitation process for treating both concentrated pure solution and impure filtrate, lab and development solutions. An alternate process using oxalic acid to precipitate the plutonium had been implemented with good success, but there remains the potential for a need to optimize the process parameters as various feed streams are processed. The wide variety in input streams will require assistance from laboratory development groups to assure optimum precipitation

parameters are used. The correct parameters will enhance throughput, minimize plutonium lost to the filtrate, and prevent process upsets.

Schedule Requirements:

Earliest Date Required: October, 2000
Latest Date Required: April, 2002

The optimization can be performed concurrently with ongoing processing of solutions, and can directly address process upsets encountered as well as setting parameters for several minor categories of impure solution that will be processed at the end of the campaign. Completion within this time frame would facilitate changes to the process with minimum process disruptions..

Problem Description: When operational problems are encountered as feed streams are changed, a better understanding of the technical parameters for the precipitation process is needed to avoid additional (and possibly unnecessary) time and funding requirements to process Pu-bearing solutions.

Potential Life-Cycle Cost Savings of Need (in $000s) and Cost Savings Explanation: If significant problems are encountered during treatment of solutions with impurities, the cost impact could be on the order of $330,000 for a single month (operational cost of the campaign is near $4 million/year) of processing delays that push out the end date of completing stabilization activities.

Benefit to the Project Baseline of Filling Need: Reduces risk and assures meeting project milestones for solution stabilization.

Relevant PBS Milestone: TRP-01-500, Complete stabilization and packaging of plutonium solutions, 12/31/01. Milestone -DNFSB 2000-1 IP Milestone, IP Commitment Number 106.

Functional Performance Requirements: In general terms, the requirements are to develop and conduct a program that provides a better understanding of the operating range and conditions for the precipitation process and respond to evolving process conditions. The program must demonstrate the acceptable solution characteristics (Pu concentration, pH range, acid normality, etc.) for the process to successfully process the solutions.

Work Breakdown Structure (WBS) No.:	***TIP No.:***
1.04.05.01.03	N/A

Justification For Need:

Technical: DNFSB Recommendation 2000-1 identifies the need to convert this material into a form suitable for long-term storage.

Regulatory: Tri-Party Agreement Milestone M-83-00: Complete Stabilization of Process Areas Resulting from EIS ROD [PFP (Date: TBD - under negotiation)]. DNFSB 94-1 Implementation Plan, Commitment Number 106 (Complete stabilizing and packaging plutonium solutions) which is due December 2001.

Environmental Safety & Health: Prolonged storage of plutonium solutions presents safety/exposure concerns.

Cultural/Stakeholder Concerns: Employee and public exposure to radioactive materials is a concern of Hanford stakeholders. The Hanford Advisory Board has repeatedly stated that progress in meeting TPA milestones and DNFSB recommendations is crucial, for example in their letter of June 5, 1998 to the DNFSB Chairman.

Other: N/A.

Current Baseline Technology: The oxalate precipitation process was originally developed to treat fairly pure plutonium solutions. The application to solutions with larger amounts of impurities has been deemed to be applicable but to avoid the potential for significant dilution and/or process upsets an optimization of the baseline process is desirable.

End-User: Nuclear Materials Stabilization Project

Contractor Facility/Project Manager: George W. Jackson, Director, Nuclear Materials Stabilization Project, Fluor Hanford, Inc. (509) 373-6622

Site Technical Points-of-Contact: M. W. Gibson, Fluor Hanford, Inc. (FH), (509) 373-4869, Fax (509) 372-0232, email mark_w_Gibson@rl.gov

DOE End-User/Representative Point-of-Contact: Suzanne E. Clarke, DOE-RL, 509-373-4931, Fax 376-0695, Suzanne_E_Clarke@rl.gov